

What is claimed is:

*Sub B* 1. An image processing method comprising the step of quantifying a sense of contrast of an image represented by image data, based on the image data.

5 2. An image processing method as claimed in Claim 1, wherein the step of quantifying comprises the steps of:  
generating unsharp image data of the image data;  
generating a histogram of the unsharp image data; and  
quantifying the sense of contrast based on the  
10 histogram.

3. An image processing method as claimed in Claim 1, wherein the step of quantifying comprises the steps of:  
obtaining luminance data and color data representing  
luminance information and color information of the image from  
15 the image data;

generating unsharp luminance image data and/or unsharp  
color image data which are unsharp image data of the luminance  
data and/or the color data;

20 generating a luminance histogram and/or a color  
histogram which are histograms of the unsharp luminance image  
data and/or the unsharp color image data; and

quantifying the sense of contrast based on the luminance  
histogram and/or the color histogram.

25 4. An image processing method as claimed in Claim 3,  
wherein the step of generating the luminance histogram and/or

the color histogram is the step of generating a color histogram representing a two-dimensional frequency distribution of the unsharp color image data in the case where the color image data are generated.

5. An image processing method as claimed in Claim 1,  
wherein the step of quantifying comprises the steps of:

generating unsharp image data of the image data; and  
quantifying the sense of contrast based on position  
information of a light portion and/or a dark portion in an  
unsharp image represented by the unsharp image data.

6. An image processing method as claimed in Claim 1,  
wherein the step of quantifying/comprises the steps of:

obtaining multi-resolution image data in a plurality of frequency bands by converting the image data into multiple resolutions;

generating a histogram of the multi-resolution image data in each of the frequency bands; and

quantifying the sense of contrast based on the histogram in each of the frequency bands.

7. An image processing method as claimed in Claim 1,  
wherein the step of quantifying comprises the steps of:

obtaining luminance data and color data representing  
luminance information and color information of the image from  
the image data;

obtaining multi-resolution luminance image data and/or

multi-resolution color image data in a plurality of frequency bands by converting the luminance data and/or the color data into multiple resolutions;

generating a luminance histogram and/or a color histogram which are histograms of the multi-resolution luminance image data and/or the multi-resolution color image data in each of the frequency bands; and

quantifying the sense of contrast based on the luminance histogram and/or the color histogram in each of the frequency bands.

8. An image processing method as claimed in <sup>Claim 1</sup> ~~any one of claims 1 to 7~~, further comprising the step of carrying out image processing on the image data based on the sense of contrast.

9. An image processing method as claimed in Claim 8, wherein the image processing is at least one of tone conversion processing, frequency enhancing processing, AE processing and chroma conversion processing.

10. An image processing method comprising the step of carrying out image processing for changing luminance information of an image represented by image data on the image data based on color information of the image.

11. An image processing method as claimed in Claim 10, wherein the step of carrying out the image processing comprises the steps of:

obtaining color data representing the color information  
from the image data;

generating unsharp image data of the color data;

generating a histogram of the unsharp image data; and

5 carrying out the image processing on the image data based  
on the histogram.

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10 12. An image processing method as claimed in Claim 11,  
wherein the step of generating the histogram is the step of  
generating a histogram representing a two-dimensional  
frequency distribution of the unsharp image data.

13. An image processing method as claimed in Claim 10,  
wherein the step of carrying out the image processing  
comprises the steps of:

15 obtaining color data representing the color information  
from the image data;

obtaining multi-resolution image data in a plurality  
of frequency bands by converting the color data into multiple  
resolutions;

20 generating a histogram of multi-resolution image data  
in a lowermost frequency band out of the multi-resolution  
image data in the plurality of frequency bands; and

carrying out the image processing on the image data based  
on the histogram.

25 14. An image processing apparatus comprising  
contrast-sense quantification means for quantifying a sense

of contrast of an image represented by image data, based on the image data.

15. An image processing apparatus as claimed in Claim 14, wherein the contrast-sense quantification means comprises:

unsharp image data generating means for generating unsharp image data of the image data;

histogram generating means for generating a histogram of the unsharp image data; and

quantification means for quantifying the sense of contrast based on the histogram.

16. An image processing apparatus as claimed in Claim 14, wherein the contrast-sense quantification means comprises:

conversion means for obtaining luminance data and color data representing luminance information and color information of the image from the image data;

unsharp image data generating means for generating unsharp luminance image data and/or unsharp color image data which are unsharp image data of the luminance data and/or the color data;

histogram generating means for generating a luminance histogram and/or a color histogram which are histograms of the unsharp luminance image data and/or the unsharp color image data; and

quantification means for quantifying the sense of contrast based on the luminance histogram and/or the color histogram.

17. An image processing apparatus as claimed in Claim 16, wherein the histogram generating means generates a color histogram representing a two-dimensional frequency distribution of the unsharp color image data in the case where the unsharp image data generating means generates the unsharp color image data.

18. An image processing method as claimed in Claim 14, wherein the contrast-sense quantification means comprises:  
unsharp image data generating means for generating unsharp image data of the image data; and  
quantification means for quantifying the sense of contrast based on position information of a light portion and/or a dark portion in an unsharp image represented by the unsharp image data.

19. An image processing apparatus as claimed in Claim 14, wherein the contrast-sense quantification means comprises:

multi-resolution conversion means for obtaining multi-resolution image data in a plurality of frequency bands by converting the image data into multiple resolutions;

histogram generating means for generating a histogram of the multi-resolution image data in each of the frequency

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bands; and

quantification means for quantifying the sense of contrast based on the histogram.

20. An image processing apparatus as claimed in Claim 14, wherein the contrast-sense quantification means comprises:

conversion means for obtaining luminance data and color data representing luminance information and color information of the image from the image data;

multi-resolution conversion means for obtaining multi-resolution luminance image data and/or multi-resolution color image data in a plurality of frequency bands by converting the luminance data and/or the color data into multiple resolutions;

histogram generating means for generating a luminance histogram and/or a color histogram which are histograms of the multi-resolution luminance image data and/or the multi-resolution color image data in each of the frequency bands; and

quantification means for quantifying the sense of contrast based on the luminance histogram and/or the color histogram in each of the frequency bands.

21. An image processing apparatus as claimed in ~~any one~~ *Claim 14* ~~of Claims 14 to 20~~, further comprising processing means for carrying out the image processing on the image data based on

the sense of contrast.

22. An image processing apparatus as claimed in Claim 21, wherein the processing means carries out, as the image processing, at least one of tone conversion processing, frequency enhancing processing, AE processing and chroma conversion processing.

23. An image processing apparatus which carries out image processing on image data for changing luminance information of an image represented by the image data, based on color information of the image.

24. An image processing apparatus as claimed in Claim 23, comprising:

conversion means for obtaining color data representing the color information of the image from the image data;

unsharp image generating means for generating unsharp image data of the color data;

histogram generating means for generating a histogram of the unsharp image data; and

processing means for carrying out the image processing on the image data based on the histogram.

25. An image processing apparatus as claimed in Claim 24, wherein the histogram generating means generates a histogram representing a two-dimensional frequency distribution of the unsharp image data.

26. An image processing apparatus as claimed in Claim



23, comprising:

conversion means for obtaining color data representing the color information of the image from the image data;

multi-resolution conversion means for obtaining multi-resolution image data in a plurality of frequency bands by converting the color data into multiple resolutions;

histogram generating means for generating a histogram of multi-resolution image data in a lowermost frequency band out of the multi-resolution image data in the plurality of frequency bands; and

processing means for carrying out the image processing on the image data based on the histogram.

27. A computer-readable recording medium storing a program to cause a computer to execute an image processing method comprising the procedure of quantifying a sense of contrast of an image represented by image data, based on the image data.

28. A computer-readable recording medium as claimed in Claim 27, wherein the procedure of quantifying the sense of contrast comprises the procedures of:

generating unsharp image data of the image data;  
generating a histogram of the unsharp image data; and  
quantifying the sense of contrast based on the histogram.

29. A computer-readable recording medium as claimed in

Claim 27, wherein the procedure of quantifying the sense of contrast comprises the procedures of:

obtaining luminance data and color data representing luminance information and color information of the image from the image data;

generating unsharp luminance image data and/or unsharp color image data which are unsharp image data of the luminance data and/or the color data;

generating a luminance histogram and/or a color histogram which are histograms of the unsharp luminance image data and/or the unsharp color image data; and

quantifying the sense of contrast based on the luminance histogram and/or the color histogram.

30. A computer-readable recording medium as claimed in Claim 27, wherein the procedure of generating the luminance histogram and/or the color histogram is the step of generating a color histogram representing a two-dimensional frequency distribution of the unsharp image data in the case where the color image data are generated.

31. A computer-readable recording medium as claimed in Claim 27, wherein the procedure of quantifying the sense of contrast comprises the procedures of:

generating unsharp image data of the image data; and

quantifying the sense of contrast based on position information of a light portion and/or a dark portion in an

unsharp image represented by the unsharp image data.

32. A computer-readable recording medium as claimed in Claim 27, wherein the procedure of quantifying the sense of contrast comprises the procedures of:

5 obtaining multi-resolution image data in a plurality of frequency bands by converting the image data into multiple resolutions;

generating a histogram of the multi-resolution image data in each of the frequency bands; and

10 quantifying the sense of contrast based on the histogram of each of the frequency bands.

33. A computer-readable recording medium as claimed in Claim 27, wherein the procedure of quantifying the sense of contrast comprises the procedures of:

15 obtaining luminance data and color data representing luminance information and color information of the image from the image data;

20 obtaining multi-resolution luminance image data and/or multi-resolution color image data in a plurality of frequency bands by converting the luminance data and/or the color data into multiple resolutions;

25 generating a luminance histogram and/or a color histogram which are histograms of the multi-resolution luminance image data and/or the multi-resolution color image data in each of the frequency bands; and

quantifying the sense of contrast based on the luminance histogram and/or the color histogram in each of the frequency bands.

34. A computer-readable recording medium as claimed in *Claim 27*  
5 *A* ~~any one of Claims 27 to 33~~, further comprising the procedure of carrying out image processing on the image data based on the sense of contrast.

35. A computer-readable recording medium as claimed in Claim 34, wherein the procedure of carrying out the image processing is the procedure of carrying out at least one of tone conversion processing, frequency enhancing processing, AE processing and chroma conversion processing.

36. A computer-readable recording medium storing a program to cause a computer to execute an image processing method for carrying out image processing for changing luminance information of an image represented by image data on the image data, based on color information of the image.

37. A computer-readable recording medium as claimed in Claim 36, wherein the program comprises the procedures of:  
20 obtaining color data representing the color information from the image data;

generating unsharp image data of the color data;

generating a histogram of the unsharp image data; and

25 carrying out the image processing on the image data based on the histogram.

38. A computer-readable recording medium as claimed in Claim 37, wherein the procedure of generating the histogram is the procedure of generating a histogram representing a two-dimensional frequency distribution of the unsharp image data.

39. A computer-readable recording medium as claimed in Claim 36, wherein the program comprises the procedures of:  
obtaining color data representing the color information from the image data;

obtaining multi-resolution image data in a plurality of frequency bands by converting the color data into multiple resolutions;

generating a histogram of multi-resolution image data in a lowermost frequency band out of the multi-resolution image data in the plurality of frequency bands; and

carrying out the image processing on the image data based on the histogram.